



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/010,850	12/05/2001	Peggy J. Clews	SD6957S97604	7432

7590

05/27/2003

Sandia National Laboratories
P. O. Box 5800 - MS-0161
Albuquerque, NM 87185-0161

EXAMINER

TRAN, BINH X

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 05/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/010,850

Applicant(s)

CLEWS ET AL.

Examiner

Binh X Tran

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 March 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 11-18 is/are pending in the application.
- 4a) Of the above claim(s) 11-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Interpretation

1. The applicants argue that the term "semiconductor grade" is definite because the applicants already defined it on page 3 as being higher level of purity than "technical grade". The examiner still maintains that this term is unclear because its definition is based on another unclear term "technical grade". For the purpose of examination, the examiner will interpret that any hydrofluoric and/or sulfuric acid that are used in a semiconductor process read on the limitation of "semiconductor grade" acid.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 5-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 6,123, 865) in view of Cripe et al. (US 5,851,928).

Lin discloses a method for etching a semiconductor device comprising the step of:

etching the silicon oxide (read on oxide sacrificial material) using an etching solution comprising hydrofluoric acid (HF) and sulfuric acid (H₂SO₄) (col. 3-4).

Art Unit: 1765

Lin differs from the invention by the specific ratio between HF and sulfuric acid. Cripe discloses the specific ratio of HF:H₂SO₄ is a result effective variable. Cripe further discloses the ratio range from 1:0.3 to 1:0.7 (col. 3 lines 55-60; Note 1:0.7 \approx 1.42:1; within applicant ranges). The result effective variable is commonly determined by routine experiment. The process of conducting routine experiments so as to produce an expected result is obvious to one of ordinary skill in the art. Hence, it would have been obvious to one having ordinary skill in the art, at the time of invention, to perform routine experiment to obtain optimal ratio as an expected result.

Respect to claim 5, Lin discloses the semiconductor wafer is used for integrated circuit (read on "micromechanical device" and/or "microelectricalmechanical device", col. 1 lines 5-10). Respect to claim 6, Lin discloses the etching temperature is in the range of 20-60 °C (Table 1, read on applicant's range of 5-70 °C). Respect to claim 7, Lin discloses the HF and H₂SO₄ are used in the semiconductor etching (read on "semiconductor grade).

Respect to claim 8-9, Lin fails to disclose the specific concentration of HF and H₂SO₄. In a semiconductor etching using HF and H₂SO₄, Cripe discloses the concentration of H₂SO₄ at 96% (read on at least 90%) and the concentration of HF is at 49 % (read on 40-50%, col. 4 lines 5-10). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Lin in view of Cripe by using HF and H₂SO₄ at the above concentration because it has a desire etch rate for semiconductor material.

Art Unit: 1765

4. Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin, Cripe in view of Gennissen ("Sacrificial Oxide Etching Compatible with Aluminum Metallization")

Respect to claim 2, Lin does not disclose the semiconductor device comprise at least one polysilicon layer. In a method for sacrificial etching, Gennissen discloses a polysilicon layer. It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Lin and Cripe in view of Gennissen by using the polysilicon layer because it will act as accelerometer for the interconnect.

Respect to claim 3, Gennissen further discloses a aluminum layer. It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Lin in view of Gennissen by using a aluminum layer because it can be used as an interconnect layer.

Respect to claim 4, Gennissen discloses the etch selectivity for the oxide sacrificial relative to aluminum range from 40 to 680 (within applicant range of greater than 100). Gennissen further discloses the selectivity is a result effective variable (Table 3). The result effective variable is commonly determined by routine experiment. The process of conducting routine experiments so as to produce an expected result is obvious to one of ordinary skill in the art. Hence, it would have been obvious to one having ordinary skill in the art, at the time of invention, to perform routine experiment to obtain optimal selectivity as an expected result.

R s p o n s t o A r g u m e n t s

Art Unit: 1765

5. Applicant's arguments with respect to claims 2-4 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments filed 3-25-2003 with respect to claim 1 have been fully considered but they are not persuasive. The applicants argues that claim 1 (incorporate the limitation of cancel claim 10) is unobvious over the combination of Cripe and Lin. According to applicants, the references would not result in a ratio of HF:H₂SO₄ ranging from 1:1 to 3:1 since Lin discloses a ratio of HF:H₂SO₄ in the range of 1:3 to 1:20. The examiner disagrees. First the examiner considers that Cripe discloses a specific ratio of HF:H₂SO₄ of 1:42:1 that is within applicant's range. Second, teaching a way or another way is not teaching away. Teaching another way refers to the fact the reference teaches a preferred, or an alternative way to a claimed way of accomplishing something.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 1765

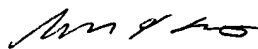
the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X Tran whose telephone number is (703) 308-1867. The examiner can normally be reached on Monday-Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin L Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Binh X. Tran
May 22, 2003


BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700